

AMENDMENTS TO THE DRAWINGS

The attached sheets of drawings includes changes to Fig. 1-3. These sheets, which includes Fig. 1-4, replaces the original sheets. Figure 1-3 have been noted as “Prior Art” and the identifiers in Figure 3 have been changed.

Attachment: Replacement Sheet(s)
Annotated Sheet Showing Changes

REMARKS/ARGUMENTS

Reconsideration of this application is requested. Claims 31-61 are pending in the application of which claims 31, 33, 36-43 and 45 are directed to elected subject matter while the remaining claims have been withdrawn from consideration as being directed to non-elected subject matter.

Information Disclosure Statement

Submitted herewith (with appropriate fee to assure consideration) is a further Information Disclosure Statement providing English abstracts of JP 60126586 and 60129593. The MacRae article lined through in the copy of the PTO/SB/08A but is cited by the examiner in PTO/892 supplied with the Official Action.

Drawings

The drawings have been amended to employ in Figure 3 a different set of identifiers and corresponding changes have been made in the paragraph bridging pages 2 and 3 of the specification.

Figures 1-3 of the drawings have been designated as "Prior Art" and this agrees with the acknowledgement of same on page 8 of the PCT publication. It is submitted that the drawings as amended and supplied with this response are acceptable and applicants request that they be accepted.

Claim Clarity

Claim 31 has been rejected as being unclear with regard to the term "substantially equal to or higher than the melting point". The term "substantially" has been deleted from claim 31.

In item 7 of the Official Action the examiner expresses concerns for contaminating impurities, impurities and consistent use of the appropriate terms. Claim 31 has been amended to address the examiner's concerns as have dependent claims 37, 40 and 41.

It is submitted that the claims are in appropriate formal order and withdrawal of the rejections in items 6 and 7 of the Official Action is requested.

New claims 51-61 have been added directed to preferred aspects of the disclosure. Claim 51 is supported by page 7, lines 17 and 18 of the published PCT publication. Claim 52 is supported by page 7 lines 16 and 17.. Claim 53 is supported by page 5 line 7. Claim 54 is supported by page 4 lines 25 to 31 and page 5 lines 14 and 15. Claim 55 is supported by page 5

lines 7 to 9. Claim 56 is supported by page 5 line 15. Claim 57 is supported by page 5 lines 28 to 30. Claim 58 is supported by page 5 lines 24 to 30. Claims 59 to 61 are supported by page 4 lines 11 to 15. Favorable consideration of new claims 51-61 is requested.

Response to Claim Rejections Under 35 USC §103(a)

Prior art objections are raised in paragraphs 8 to 11 of the Office Action. With reference to these objections, in the above claim amendments, claim 31 has been amended to state that the metal particles are introduced into a heat source “such that the particles are out of contact with any surfaces”. This wording is taken from page 5, line 7 of the PCT publication, in the statement that “the common purpose of these embodiments is to suspend the particles individually in mid-air, out of contact with any surfaces”.

The Examiner refers to EP 0047665 (Evans) and states that Evans teaches a method of metal distillation. However, in Evans the metal for purification is in the form of sponge placed within baskets in a furnace (page 4, lines 12 to 16). Consequently, Evans does not teach introducing metal particles into a heat source, such that the particles are out of contact with any surfaces. First, Evans does not teach the heat treatment of particles and second, his metal for purification is clearly in contact with the surface of a basket.

On page 6, lines 8 to 10 of the Office Action, the Examiner states that “Evans teaches that the metal is heated to temperatures as high as 1,100C meeting the limitation of “substantially equal to the melting point.” However, like Evans, the main examples in the present application concern the purification of titanium powder, which has a melting point of 1,725C. It is difficult to see that 1,100C is “substantially equal to” 1,725C. In addition, Evans describes a method for distilling reaction products from metal sponge (e.g. page 1 line 3, page 1 lines 23 and 24, and page 2 lines 16 and 17). The product of Evans’ method is clearly described as “the remaining metal sponge for subsequent final refining”. Thus, Evans clearly does not intend to melt the metal sponge at all.

In fact, the Examiner acknowledges this point himself, stating at page 6, lines 13 and 14 of the Office Action, that “it would have been obvious to one of ordinary skill in the art to have practiced the method of Evans, and to have cooled and collected the metal sponge afterwards”.

In paragraph 10, the Examiner objects that various claims are unpatentable over US 4602947 (McClincy).

The Examiner states, at page 7 line 4 of the Office Action that “McClincy teaches a method of purifying titanium particles” and refers to the abstract of McClincy. In fact, McClincy teaches, as described in the Abstract “a process for producing (not purifying) titanium metal in finely-divided particulate form, by forming a liquid mixture of titanium and zinc, fracturing and solidifying the liquid mixture and evaporating zinc from the resulting finely-divided particles to produce finely-divided particulate titanium.”. As described in column 1 of McClincy, McClincy aims to solve the problem that it is difficult to form finely-divided titanium powders and proposes the method set out at column 2, lines 1 to 10. The first step is to form a liquid zinc-titanium mixture, containing between 10 and 25 wt%Ti, and preferably 8 to 15 wt%Ti (column 3 lines 50 to 54). As McClincy states, the lower titanium contents are preferred (column 3 line 54). The mixture is therefore predominantly Zn and not Ti. McClincy then fractures and solidifies the mixture of Zn and Ti to produce finely divided particles of the mixture (column 3 lines 64 and 65) which are then heated to about 800C to 1000C in a zinc evaporation zone (column 3 line 67 to column 4 line 3). Upon evaporation of the zinc, finely divided particles of titanium are recovered (column 4 lines 3 to 5).

The Examiner states at page 7, lines 7 to 9 that this temperature of 800-1000C meets the limitation of “a temperature substantially equal to or higher than the melting point”. Again, it is noted that in McClincy and in the primary examples in the patent application, treatment of Ti is described, having a melting point of 1,725C.

McClincy does not teach the feature that the metal particles are introduced into a heat source, such that the particles are out of contact with any surfaces. The Examiner comments at page 8, lines 4 to 8 that McClincy “teaches that the particles may be recovered through gravimetric separation, thus meeting the limitation of allowing the particles to freefall past a heat source” (regarding claim 39) and that “the fall is sufficient to allow solidification” (regarding claim 39). McClincy does mention gravimetric separation, at column 5 lines 2 to 3. However, as described in the previous text in column 4, this reference is to a process in which a liquid mixture of Zn and Mg is reacted with TiCl_4 . The reaction products are Ti, Zn, and MgCl_2 . As described at column 4 lines 63 to 67, these form a liquid mixture of Ti and Zn and a liquid stream of MgCl_2 . McClincy goes on to state that the MgCl_2 stream is immiscible with and less dense than the liquid mixture of Ti and Zn, and is readily separated and recovered by gravimetric

separation. This simply means that the immiscible $MgCl_2$ floats to the surface of the liquid mixture of Ti and Zn and can be recovered.

The Examiner's suggestion that this "meets the limitation of allowing the particles to freefall pass a heat source" does not seem appropriate. McClincy's reference to gravimetric separation refers to the separation of two immiscible liquids, and does not involve any solid materials, any particles, or any components in "freefall".

Further, following his mention of gravimetric separation, at column 5 lines 3 to 7, McClincy states that the resulting Zn-Ti mixture is passed to a Zn evaporation zone, where Zn is evaporated to produce sponge titanium. Thus, this method does not seem to produce or involve powder or particles at any stage.

The Examiner's comment regarding claim 39, that "McClincy teaches that the fall is sufficient to allow solidification", seems to relate to a completely different portion of McClincy. The Examiner refers to columns 4 to 5 of McClincy but the only text describing any sort of "falling" seems to be at column 3 lines 25 to 39. Here, McClincy describes a method for fracturing and solidifying a liquid mixture of Zn and Ti involving inert gas atomisation or shotting towers. These techniques may be used to convert the liquid mixture of Zn and Ti to finely divided particles, but this has no relevance to the present invention. McClincy's particles produced by these methods are Zn-Ti particles, and the Zn is removed later in a separate Zn evaporation zone. McClincy makes no suggestion at all that metal particles may be purified in a method involving introducing the particles into a heat source such that the particles are out of contact with any surfaces.

Still less does McClincy suggest heating the particles to a temperature equal to or higher than the melting point of the metal. Again, taking Ti as an example, McClincy teaches at column 5 lines 36 and 37 that temperatures below 925C are preferred for purification of Ti, while the melting point of Ti is much higher, at 1725C.

In paragraph 11, the Examiner refers to a paper by MacRae. This simply describes the use of various heat sources in metal production and does not appear to threaten the patentability of the invention given that McClincy, with which the Examiner combines MacRae, is not relevant.

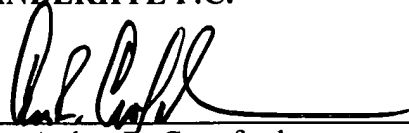
WARD-CLOSE et al
Appl. No. 10/529,234
October 14, 2008

For the above reasons it is respectfully submitted that the claims of this application define subject matter that is patentable over the prior art. Reconsideration and allowance are solicited. Should the examiner require further information, please contact the undersigned.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: _____



Arthur R. Crawford
Reg. No. 25,327

ARC:eaw
901 North Glebe Road, 11th Floor
Arlington, VA 22203-1808
Telephone: (703) 816-4000
Facsimile: (703) 816-4100

Fig.1.

PRIOR
 ART

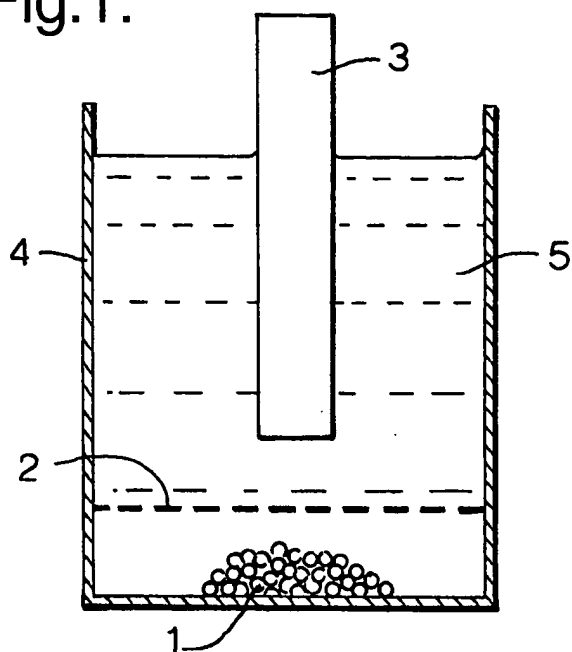


Fig.2.

PRIOR
 ART

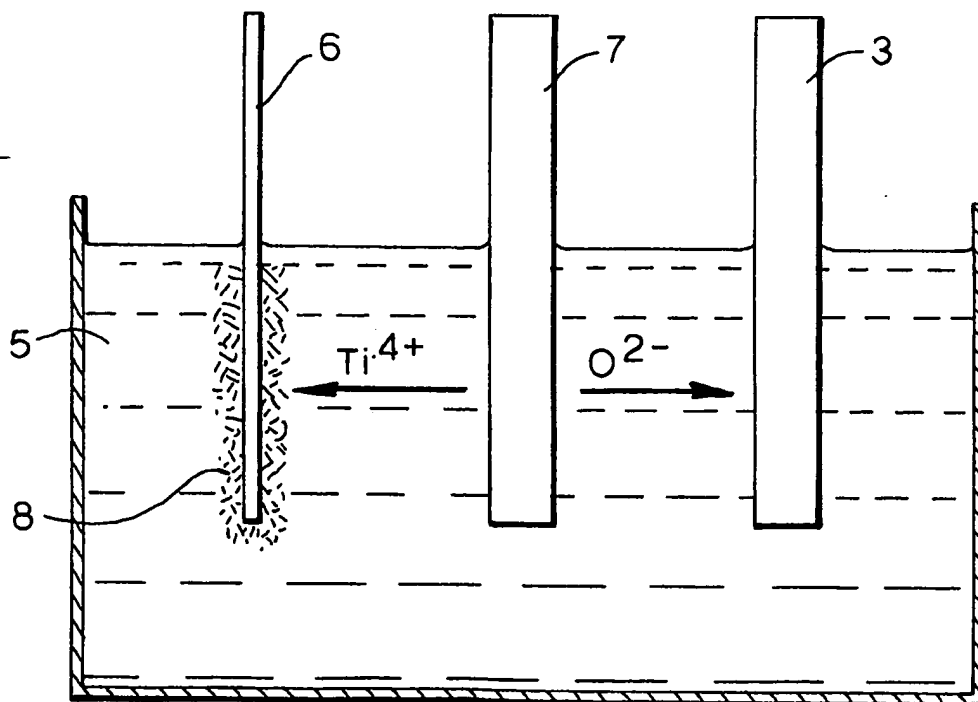


Fig.4.

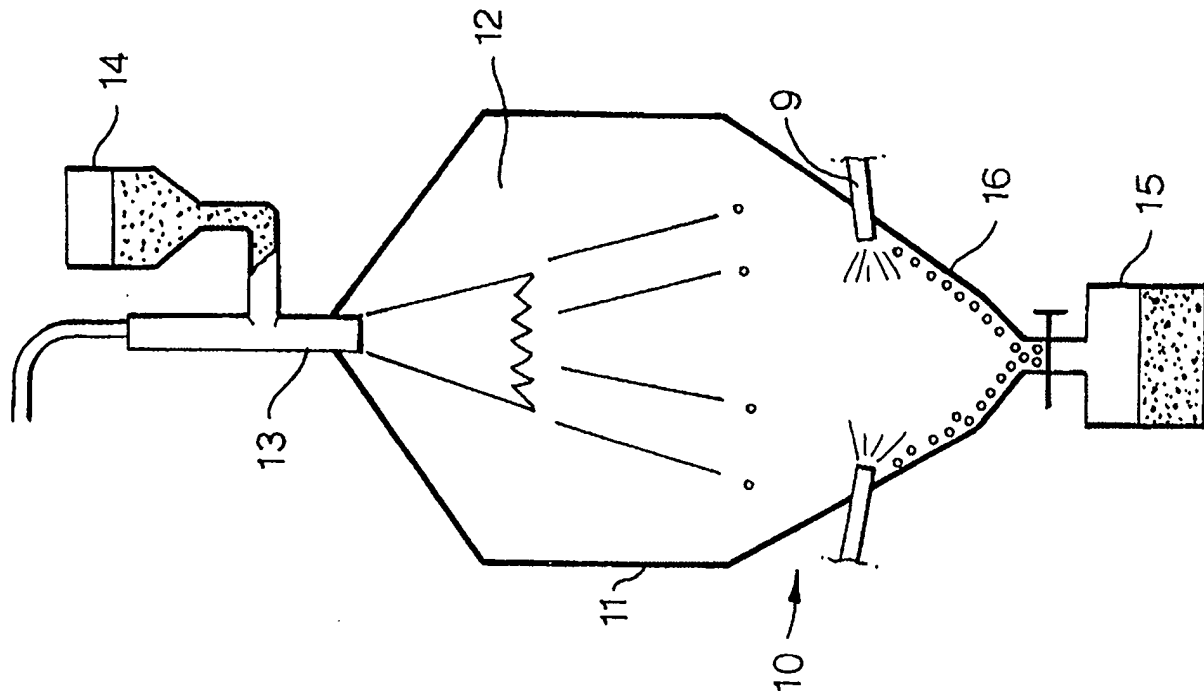


Fig.3.

Prior
 Art

